pragma's

product profiles

Issue #38[illegible]   The *free* newspaper for Pick™users.   August [illegible], 1987

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Slaving printers on Pick

Although the Pick operating system has a fairly sophisticated spooler that does a good job of managing an arbitrary number of output queues among an arbitrary number of printers, there are still a couple of disadvantages to using spooled printers. For example, you might not get immediate output on a spooled printer because it's already tied up printing other jobs. Spooled printers also require their own ports, which can be in short supply. An often overlooked alternative to spooled printers are dedicated or "slave" printers, which plug into your terminal instead of your computer.

Slave printers take advantage of the fact that most of today's display terminals come equipped with two serial connectors or ports. One port is typically labeled "modem" or "computer", and is where the serial cable from the computer (or the phone line via a modem) is plugged in. The other "auxiliary" port is typically labeled "aux" or "printer", and is where the serial cable from a slave printer can be plugged in.

With a dedicated slave printer, a terminal can immediately print output whenever it wants, without requiring the spooler, and without requiring a port on the computer for the printer.

As an example of how slave printers work with a terminal, let's examine two typical peripherals for a Pick computer: a Wyse model 50 terminal and a C. Itoh dot matrix serial printer.

After a Wyse 50 terminal is turned on, the characters it receives at its modem port are displayed on the screen. The aux port is not used at all. But if the Wyse 50 receives the special character equivalent to `CHAR (24)` in BASIC, subsequently received characters are not displayed, but are instead transmitted out the aux port. If a printer is connected to the Wyse aux port, it will receive and print those characters.

When the Wyse 50 finally receives the character equivalent to `CHAR (20)`, it will turn off its aux port, and subsequent characters will again be displayed on the screen. That allows a program to start and stop output to the slave printer at will.

For example:

```
PRINT "OUTPUT TO THE CRT"
PRINT CHAR(24) : ;* Aux port on
PRINT "OUTPUT TO SLAVE PRINTER"
PRINT CHAR(20) : ;* Aux port off
PRINT "OUTPUT TO THE CRT"
```

One problem with embedding `CHAR ()` codes right in a program is that different terminal manufacturers often require different codes for controlling the aux port. For example, while a `CHAR (24)` is necessary for a Wyse 50, another terminal model instead requires a `CHAR (27)` followed by "#".

Some Pick systems offer terminal-independent `@` functions that send the correct aux port control characters for each possible terminal type. For example, `PRINT @ (-11) :` turns on the aux port and `PRINT @ (-12)` turns it off on a Zebra system, regardless of the current terminal being used, so that programs can be written without using `CHAR ()` that will always run correctly even if a port's terminal type is changed with the TERM command. A separate utility program is used to define what characters are actually transmitted when `@ (-11)` and `@ (-12)` are encountered in a program. If the current TERM setting is for terminal type `W`, then `@ (-11)` can translate into `CHAR (24)`. If the TERM setting is type `Q`, then `@ (-11)` can generate `CHAR (27) : "#"`.

Most terminals recognize a large variety of special codes for controlling output to the aux port in different ways. For example, `CHAR (18)` causes a Wyse 50 to send received characters to the aux port *and* display them on the screen at the same time. `CHAR (27) : "P"` will print a copy of the current screen display. And holding down the SHIFT and CTRL keys while pressing PRINT on the keyboard allows the operator to manually toggle the aux port on and off. Consult your specific terminal's documentation to find out the allowable ways to control your slave printer.

Procs can also easily control your terminal's aux port. For example, the proc command `T X18+` will output a hexadecimal 18 (decimal 24) character and turn the aux port on. A proc like

```
PQ
T X18+
HLIST CUSTOMERS (B)
P
T X0C,X14+
```

will turn the aux port on, print the report, output a form feed, and turn the

---

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aux port off. The `(B)` option suppresses the line feed normally caused by the parsing of a command like `LIST`, so a line feed won't end up on the printer.

When using a modem, the character transmission speed is usually so slow that a slave printer can easily print and keep up with all characters received by the terminal. But with a direct connection to a computer, a terminal is usually receiving characters at a transmission rate of 9600 baud (almost 1000 characters per second) or more, which is faster than most serial slave printers can print. How can a slave printer keep up?

One solution is for the terminal to receive data at the main port at a high rate like 9600 baud and send characters out the aux port at a slower rate that the printer can always keep up with, like 1200 baud. But an even better solution usually exists because most printers today have a few thousands characters or so of buffer memory. That means the printer can receive characters at a high baud rate, at least until its buffer memory is full, then print the contents of the buffer at its leisure. The advantage is that the terminal can quickly dump everything to the printer's memory (a kind of spooling, but done with hardware) and then immediately become available to the operator, instead of being tied up at a slow aux baud rate waiting for the printer to finish. However, the terminal and the slave printer still need to "handshake", so the terminal doesn't continue sending characters out the aux port once the printer's memory fills up.

On a Wyse 50, the aux port can handshak[illegible]g the data-terminal-ready or D[illegible] protocol. That simply means that if the voltage is raised on pin 20 (called the DTR pin) of the aux port connector, the terminal will stop transmitti[illegible]t the aux port until the DTR signa[illegible]ops. If a slave printer also supports the DTR protocol (and most do), it can force the terminal to pause whenever the printer is too busy printing or its memory is full and there is a danger of characters being lost.

Our example C. Itoh printer is easily configured for use with a Wyse 50. Small switches inside the printer can be set to make it use a baud rate of 9600 and the DTR protocol. The SETUP key on the Wyse 50 keyboard allows the operator to define a matching baud rate of 9600 for the aux port. Just about any four-wire cable, such as telephone wire, can be used to connect the two devices. Using the so-called RS232 convention, a wire from pin 20 of the connector on the printer goes to pin 20 on the terminal's aux port for transmitting the DTR signal. Pin 7 goes to pin 7 for signal ground, pin 3 goes to pin 3 for transmitting the data to the printer, and pin 2 goes to pin 2 for transmissions from the printer to the terminal.

Now the printer is ready. The CRT can quickly dump a few thousand characters to the printer and then immediately go back to keyboard input and screen output while the slave prints. Occasionally, a long listing will fill the printer's buffer, and the terminal will hang on the DTR signal, waiting for the printer to catch up, empty it's buffer, and accept more data from the aux port. But for shorter listings, the terminal will always be available. And printed output will always be immediate and close by, without requiring the spooler or its own port.

This month's mailbag

More on lotto

Though your article on lotto in *Product Profiles #35* was no doubt intended as more of a theoretical platform for random number generation and database systems rather than a retirement planning exegesis, there are some of us who have been analyzing lotto on a Zebra in a less serendipitous fashion.

On this coast, the belief is that the draw is not random, and that analysis of previous draws *do* show a bias. We are attempting to implement the "wheeling" (combination sampling) systems described in Gail Howard's *State Lotteries* on numbers we determine to have an edge. For example, it almost appears that two numbers from the previous drawing will show up in the current drawing. Howard states that 87% of winning numbers have hit within the past ten games, and the majority of those have hit within the past five.

I would be interested in any work or ideas others might have pursued in breaking the astronomical odds of lotto. It would be more interesting if the analysis were limited to a Pick system, rather than open to a Cray or a Bell Lab cluster analysis. After all, the idea is to win a million, not spend it.

Archie M. Andrews
Alexandria, VA

We vaguely recall an article published in* Time *around 1947 that went something like this: two students

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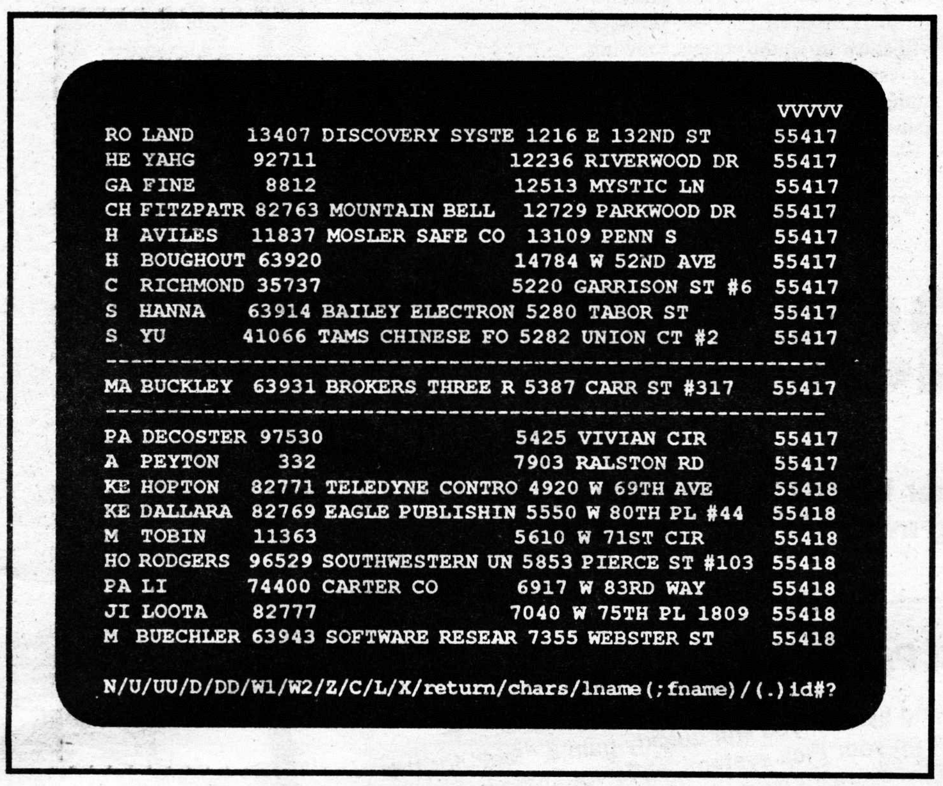
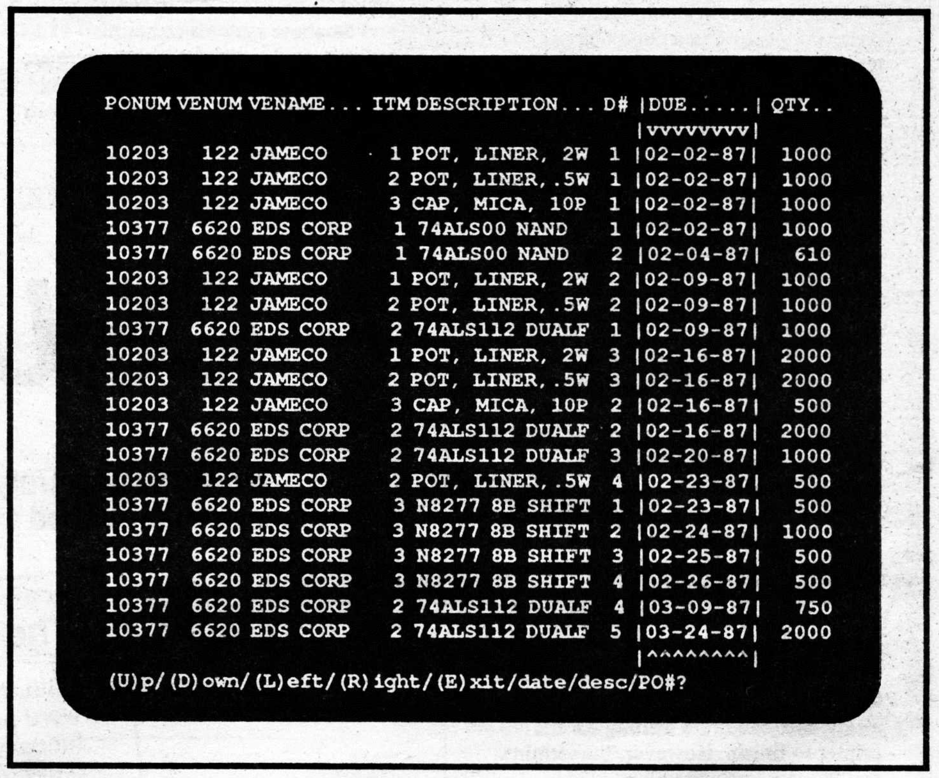


```
                                                           VVVVV
RO LAND     13407 DISCOVERY SYSTE 1216 E 132ND ST          55417
HE YAHG     92711                 12236 RIVERWOOD DR       55417
GA FINE      8812                 12513 MYSTIC LN          55417
CH FITZPATR 82763 MOUNTAIN BELL   12729 PARKWOOD DR        55417
H  AVILES   11837 MOSLER SAFE CO  13109 PENN S             55417
H  BOUGHOUT 63920                 14784 W 52ND AVE         55417
C  RICHMOND 35737                 5220 GARRISON ST #6      55417
S  HANNA    63914 BAILEY ELECTRON 5280 TABOR ST            55417
S  YU       41066 TAMS CHINESE FO 5282 UNION CT #2         55417
---------------------------------------------------------------
MA BUCKLEY  63931 BROKERS THREE R 5387 CARR ST #317        55417
---------------------------------------------------------------
PA DECOSTER 97530                 5425 VIVIAN CIR          55417
A  PEYTON     332                 7903 RALSTON RD          55417
KE HOPTON   82771 TELEDYNE CONTRO 4920 W 69TH AVE          55418
KE DALLARA  82769 EAGLE PUBLISHIN 5550 W 80TH PL #44       55418
M  TOBIN    11363                 5610 W 71ST CIR          55418
HO RODGERS  96529 SOUTHWESTERN UN 5853 PIERCE ST #103      55418
PA LI       74400 CARTER CO       6917 W 83RD WAY          55418
JI LOOTA    82777                 7040 W 75TH PL 1809      55418
M  BUECHLER 63943 SOFTWARE RESEAR 7355 WEBSTER ST          55418

N/U/UU/D/DD/W1/W2/Z/C/L/X/return/chars/lname(;fname)/(.)id#?
```

Within minutes of loading the B-TREE-P source code, this customer began using B-TREE-P's standard "browser" for searching a 120,000+ record customer master file. Any name, company, or address can immediately be located and displayed, just by typing one or more characters that match the field. No more waiting for SELECTs!



```
PONUM VENUM VENAME... ITM DESCRIPTION... D# |DUE.....| QTY..
                                            |vvvvvvvv|
10203   122 JAMECO      1 POT, LINER, 2W  1 |02-02-87|  1000
10203   122 JAMECO      2 POT, LINER,.5W  1 |02-02-87|  1000
10203   122 JAMECO      3 CAP, MICA, 10P  1 |02-02-87|  1000
10377  6620 EDS CORP    1 74ALS00 NAND    1 |02-02-87|  1000
10377  6620 EDS CORP    1 74ALS00 NAND    2 |02-04-87|   610
10203   122 JAMECO      1 POT, LINER, 2W  2 |02-09-87|  1000
10203   122 JAMECO      2 POT, LINER,.5W  2 |02-09-87|  1000
10377  6620 EDS CORP    2 74ALS112 DUALF  1 |02-09-87|  1000
10203   122 JAMECO      1 POT, LINER, 2W  3 |02-16-87|  2000
10203   122 JAMECO      2 POT, LINER,.5W  3 |02-16-87|  2000
10203   122 JAMECO      3 CAP, MICA, 10P  2 |02-16-87|   500
10377  6620 EDS CORP    2 74ALS112 DUALF  2 |02-16-87|  2000
10377  6620 EDS CORP    2 74ALS112 DUALF  3 |02-20-87|  1000
10203   122 JAMECO      2 POT, LINER,.5W  4 |02-23-87|   500
10377  6620 EDS CORP    3 N8277 8B SHIFT  1 |02-23-87|   500
10377  6620 EDS CORP    3 N8277 8B SHIFT  2 |02-24-87|  1000
10377  6620 EDS CORP    3 N8277 8B SHIFT  3 |02-25-87|   500
10377  6620 EDS CORP    3 N8277 8B SHIFT  4 |02-26-87|   500
10377  6620 EDS CORP    2 74ALS112 DUALF  4 |03-09-87|   750
10377  6620 EDS CORP    2 74ALS112 DUALF  5 |03-24-87|  2000
                                            |^^^^^^^^|
(U)p/(D)own/(L)eft/(R)ight/(E)xit/date/desc/PO#?
```

This customer has set up B-TREE-P for purchase order inquiries. A file of multivalued line items and submultivalued delivery dates and quantities can instantly be viewed by item or by date. Pages can be scrolled at the terminal, forward or backward. Any range of data can be instantly printed. No more waiting for SORTs!

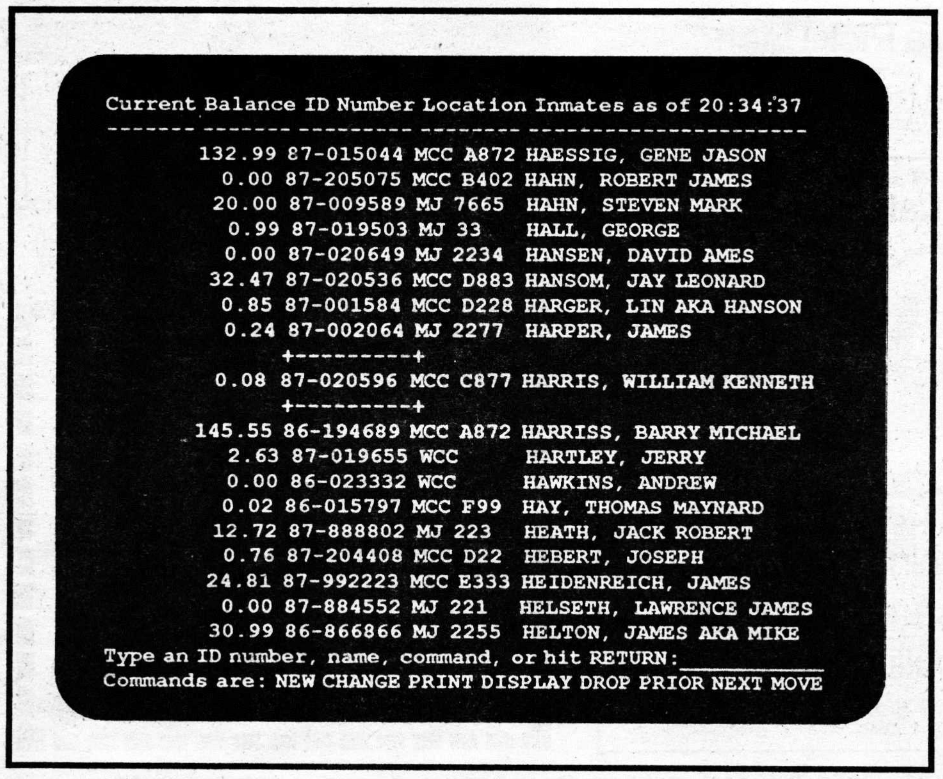
Tired of waiting for your computer to SORT or SELECT your large data files? Need to quickly find *any* attribute? Want to scroll files up or down, in any sort order? Now you can use B-TREE-P to instantly search, sort, and scroll any data from any file!

Now you can instantly look up customers by name, street, Zip code, or any other field — not just by customer number. Now you can immediately find inventory entries by quantity, cost, or description — not just by part number. Whatever files you use, now you can instantly locate and display your data *any way you want*, without having to wait for endless SORTs and SELECTs.

Immediately display any record in any file just by typing one or more starting characters that match any field in the record. You can display not only a selected record, but also any previous and next records, using any sort order you specify. You can jump to any record in a file at any time, then browse through the file by scrolling up or down, a record at a time or a page at a time, in any sort order.

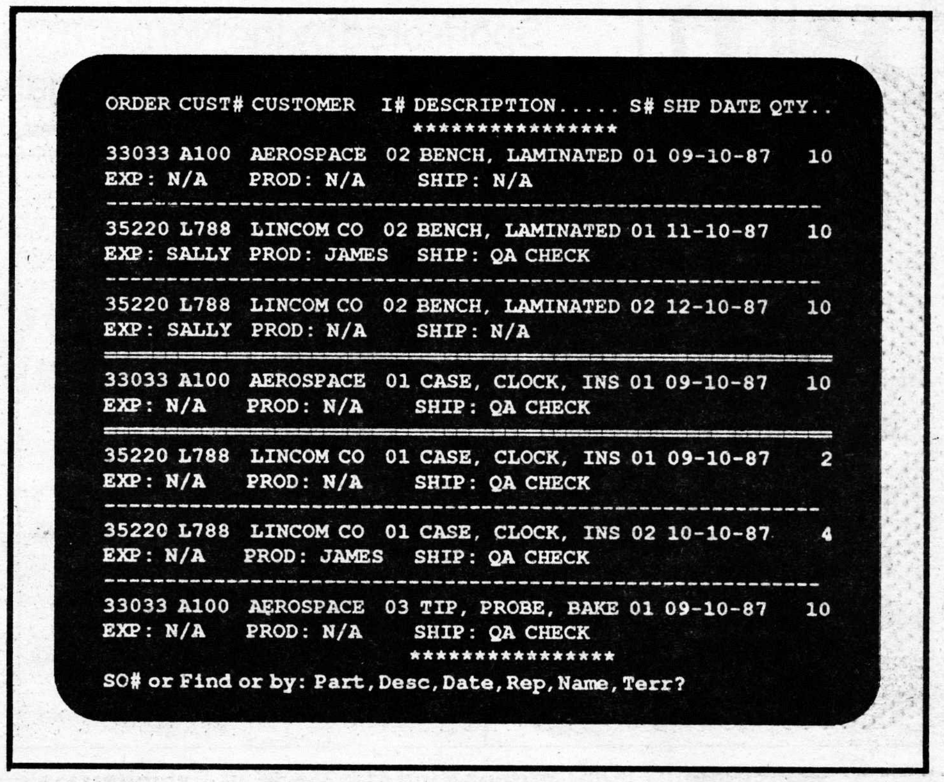
As one of Semaphore's programmers says: "We often ask ourselves why we waited so long to create B-TREE-P. After using it for our own production work, we wonder how we ever got by before without it. A Pick computer without B-TREE-P is like a car without wheels".

...until you use B-TREE-P!



```
Current Balance ID Number Location Inmates as of 20:34:37
------- ------- --------- -------- ----------------------
        132.99 87-015044 MCC A872 HAESSIG, GENE JASON
          0.00 87-205075 MCC B402 HAHN, ROBERT JAMES
         20.00 87-009589 MJ 7665  HAHN, STEVEN MARK
          0.99 87-019503 MJ 33    HALL, GEORGE
          0.00 87-020649 MJ 2234  HANSEN, DAVID AMES
         32.47 87-020536 MCC D883 HANSOM, JAY LEONARD
          0.85 87-001584 MCC D228 HARGER, LIN AKA HANSON
          0.24 87-002064 MJ 2277  HARPER, JAMES
             +---------+
          0.08 87-020596 MCC C877 HARRIS, WILLIAM KENNETH
             +---------+
        145.55 86-194689 MCC A872 HARRISS, BARRY MICHAEL
          2.63 87-019655 WCC      HARTLEY, JERRY
          0.00 86-023332 WCC      HAWKINS, ANDREW
          0.02 86-015797 MCC F99  HAY, THOMAS MAYNARD
         12.72 87-888802 MJ 223   HEATH, JACK ROBERT
          0.76 87-204408 MCC D22  HEBERT, JOSEPH
         24.81 87-992223 MCC E333 HEIDENREICH, JAMES
          0.00 87-884552 MJ 221   HELSETH, LAWRENCE JAMES
         30.99 86-866866 MJ 2255  HELTON, JAMES AKA MIKE
Type an ID number, name, command, or hit RETURN:__________
Commands are: NEW CHANGE PRINT DISPLAY DROP PRIOR NEXT MOVE
```

This county jail uses B-TREE-P for inmate cash accounting. Although cash records are filed by inmate booking numbers, B-TREE-P allows a list alphabetized by the name attribute to be displayed at all times, even as records are created and deleted at other terminals. Any inmate record (or nearest match) can be immediately found and displayed just by typing one or more characters in a name.



```
ORDER CUST# CUSTOMER   I# DESCRIPTION..... S# SHP DATE QTY..
                          ****************
33033 A100  AEROSPACE  02 BENCH, LAMINATED 01 09-10-87   10
EXP: N/A    PROD: N/A     SHIP: N/A
-----------------------------------------------------------
35220 L788  LINCOM CO  02 BENCH, LAMINATED 01 11-10-87   10
EXP: SALLY  PROD: JAMES   SHIP: QA CHECK
-----------------------------------------------------------
35220 L788  LINCOM CO  02 BENCH, LAMINATED 02 12-10-87   10
EXP: SALLY  PROD: N/A     SHIP: N/A
============================================================
33033 A100  AEROSPACE  01 CASE, CLOCK, INS 01 09-10-87   10
EXP: N/A    PROD: N/A     SHIP: QA CHECK
============================================================
35220 L788  LINCOM CO  01 CASE, CLOCK, INS 01 09-10-87    2
EXP: N/A    PROD: N/A     SHIP: QA CHECK
-----------------------------------------------------------
35220 L788  LINCOM CO  01 CASE, CLOCK, INS 02 10-10-87    4
EXP: N/A    PROD: JAMES   SHIP: QA CHECK
-----------------------------------------------------------
33033 A100  AEROSPACE  03 TIP, PROBE, BAKE 01 09-10-87   10
EXP: N/A    PROD: N/A     SHIP: QA CHECK
                          ****************
SO# or Find or by: Part,Desc,Date,Rep,Name,Terr?
```

This manufacturer uses B-TREE-P to let marketing personnel instantly display sales orders six different ways: by part, by description, by ship date, by sales rep, by customer name, and by sales territory. With just a few keystrokes, operators can instantly display records under a new sort (subsorts too) or find and output a given item.

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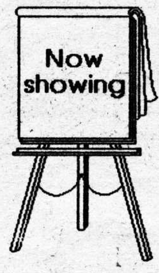

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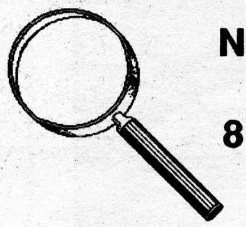

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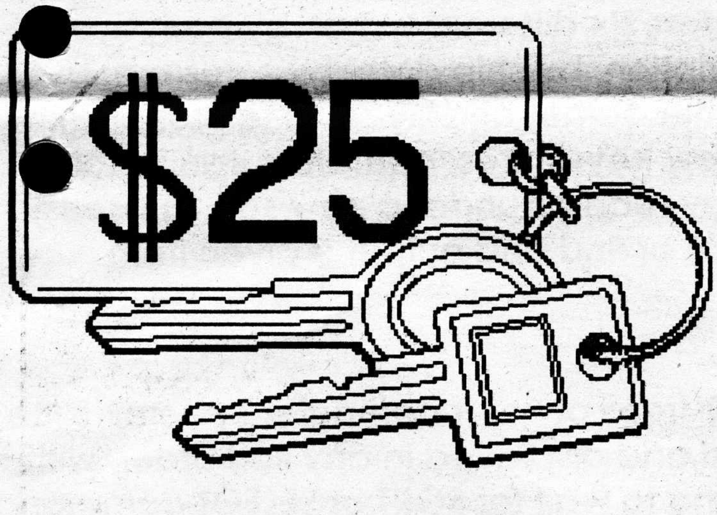

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went to Vegas and recorded all the numbers that came up on a roulette wheel for a day or two. They then began placing 25¢ bets on the most frequently occurring numbers and made a few thousand dollars before the casino finally changed the wheel.

If a lotto machine really does generate random results, then the laws of probability and statistics guarantee that the only "system" that will make you a winner at the state's prices is pure luck. But if a wheel isn't balanced, or a cam is worn, or a ping pong ball is dented, then the gambling machine won't be random, and careful observation of its results over a long enough period of time should reveal a bias. However, you can be sure the people who run the lotteries are also constantly looking for those kinds of faults. How often do they change the ping pong balls? If it's every week or so, you're never going to be able to discern a consistent bias. But if the machine hasn't been refurbished in five years, you'll have a chance (assuming the lottery personnel won't first get fired for incompetence).

Watch out for vague statements that sound like they reveal an edge, especially if it's unverified hearsay. You say two numbers from the previous week's six numbers will often be drawn again this week? No big deal. But try specifying which two. That's a much riskier bet. You say a large percentage of winning numbers have previously come up within the last ten games? Probably so! The last ten games means sixty draws. Out of only forty or fifty possible numbers in the typical lottery, wouldn't you expect a lot of repeat hits in sixty draws?

Terms li[illegible] lot" or "large percentage" or even "87%" might sound impressive, but often collapse when carefully examined with a little math. Get a g[illegible]ook on probability and gambling, p[illegible]erably authored by a math professor, and you'll quickly learn what the odds really are. For example, the classic numbers game of a $1 bet on any number from 0 to 999 for a $700 payoff equals an average per play loss of 30 cents. Bet $1 a day for ten years and most people will be out $1,217. Sure, someone might hit the $700 on their first day (and then quit if they're smart), but it will be luck that lets them come out a winner.

As another example, consider two keno machines. One will pay $3.20 for a $1 bet on any number from 1 to 80, if the number is one of 20 randomly selected by the machine. Another machine also picks 20 numbers but lets you select 5 numbers for your $1 bet. If 3 numbers agree, the machine pays $3, or $26 for 4 numbers, or $332 for five numbers. Which is the preferable machine? Your money will last longer on the first machine. You'll only lose

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an average of 20 cents per play, while the second will cost you 21.9 cents.

How about a random machine that picks 10 numbers from 1 to 20, and lets you bet $1 to match them for a $1,000 payoff, or $100 if you match 9 numbers? You'll lose 94 cents per play on the average. (Thanks to A Mathematical Journey *by Stanley Gudder for the above examples.)*

Oh well, might as well give your idle Zebra something to do. Create a file called PICKS, then use the following program to record the results every time the state picks new numbers:

```
OPEN "PICKS" ELSE STOP
LOOP
 CRT "WHAT NUMBER WAS PICKED":
  INPUT X
UNTIL X = "" DO
 READ TALLY FROM X ELSE TALLY=0
 WRITE (TALLY+1) ON X
REPEAT
STOP
END
```

(Note that the above doesn't validate the input in any way.) Before you place your bet, use the command `SORTPICKSBY-DSND 1` *(using right justification) to find the most frequently occurring numbers to bet on. But remember, in a long enough set of games against the house, you're bound to lose. That's the only way casinos and lotteries can stay in business. Meanwhile, have fun. - Editors*

Praise for SCREEN.EDIT

The screen editor in *Product Profiles #36* is a real gem. It has given us a simple, easy-to-use and easy-to-modify word processing capability for selected attributes in selected files.

For example, we continually expedite purchase orders with our vendors, with notes written on copies of the purchase orders. Now, the expeditors simply call a slightly modified version of your screen editor from the inquiry screen, and record the notes as part of the purchase order record in the computer. Now anyone reviewing the status of an order has the current information at the terminal, instead of having to call the expeditor.

We are also utilizing our credit department to record customer orders when there is a credit limit problem, or a lack of credit information. Until now, the orders were held unprocessed in the credit department until the credit problems were resolved. Now credit status is easily recorded and updated with the screen editor, and anyone checking orders for a customer has instant access to the current order status.

We will soon add similar editing capabilities to our picking ticket, vendor and inventory files, among others. Thank you for an extremely valuable tool!

One minor bug in line 83: "#" probably should be "=".

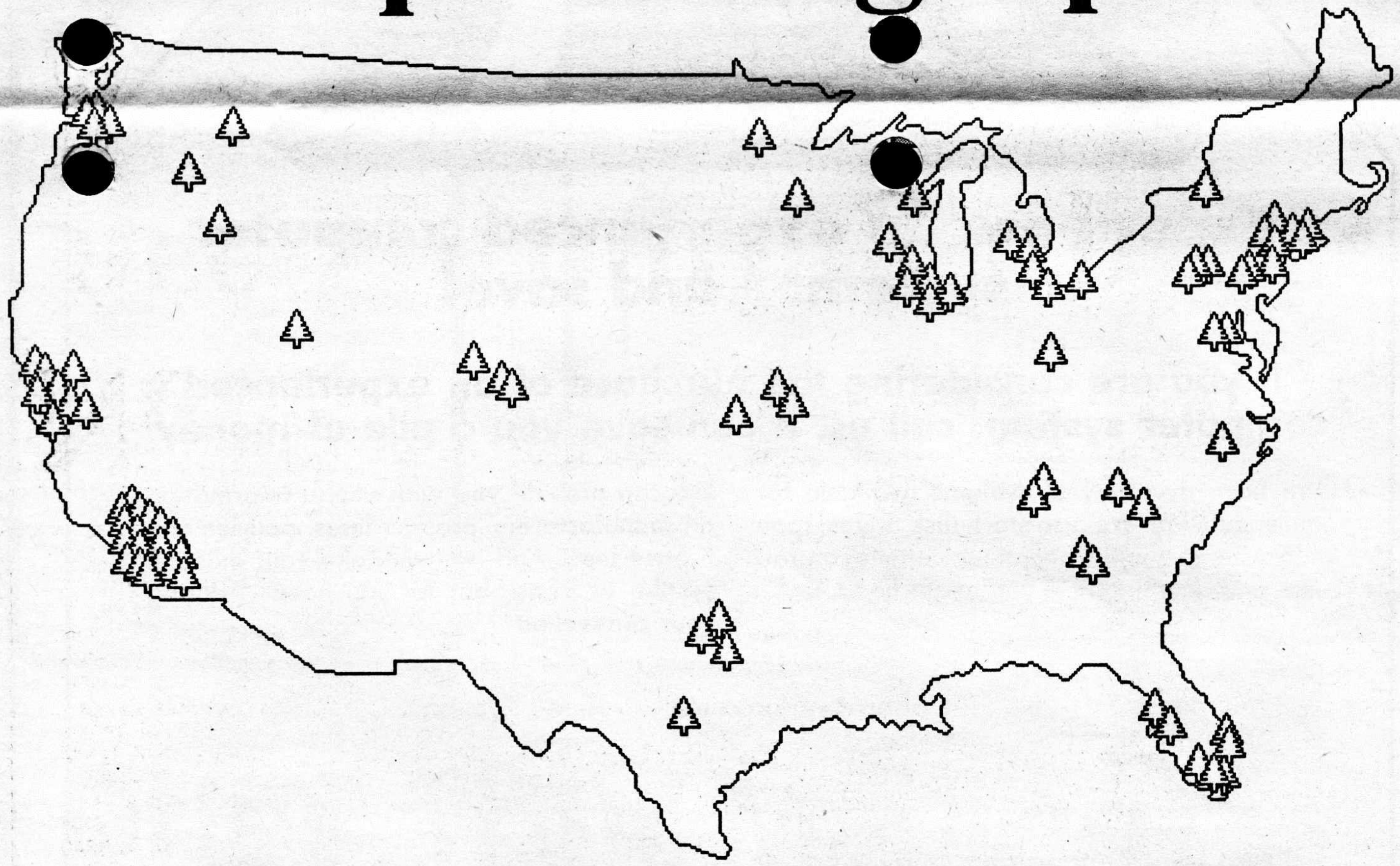
W. J. Flynn
Los Angeles, CA

Good guess, but the correct fix is to change `LINE #BOTTOM` *to* `(LINE-TOP+1) #crt.height` *in line 83.*

We were surprised at how many readers called because they had never seen a cross-reference, and wanted to know what the listing at the end of the program was. Although cross-reference listings are mainly of value when modifying and debugging code, every system administrator should know how to generate the listings because they can also provide a valuable final check for typos before a program is put into production: any statement label or variable name that is only referenced once in the listing is either a typo and needs to be corrected, or is superfluous and can be deleted.

To generate a cross-reference listing, create a file named `BSYM` *or* `CSYM`*, depending on which name your compiler requires. Then compile a program with the* `(X)` *option, and use a command like* `SORT-ITEM BSYM` *(or* `CSYM`*) to see all label and variable references. Generate a cross-reference for every program you have, and the odds are you'll find at least an error or two. - Editors*

New B-TREE-P installations are sprouting up every day!



B-TREE-P is software that allows your data to be instantly located and output, without having to wait for lengthy file sorts or searches. Join the growing number of sites discovering the power and flexibility of B-TREE-P. Write or call Semaphore Corporation, 207 Granada Drive, Aptos, CA 95003, (408) 688-9200.

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